

What is claimed is:

1. A multi-cylinder engine comprising a cylinder block (1), when taking a longitudinal direction of the cylinder block (1) as a front and rear direction, the
5 cylinder block (1) being provided with a consecutive side water passage (3) oriented in the front and rear direction and passing by each of cylinder walls (12), cooling water from a radiator being introduced into a cylinder jacket 4 laterally through the side water
10 passage (3), wherein

the side water passage (3) has front and rear end portions provided with front and rear openings (3a) and (3b) which communicate the side water passage (3) with a water pump (10), and

15 even if the water pump (10) is arranged at either of the front and rear end portions of the cylinder block (1), the opening of the side water passage (3) near the end portion where the water pump (10) is arranged, being able to communicate the side water
20 passage (3) with the water pump (10).

2. The multi-cylinder engine as set forth in claim 1, wherein the cylinder block (1) has the front and rear end portions at either of which the water pump (10) is arranged, the opening of the side water passage (3) near the end portion where the water pump (10) is
25 arranged, communicating the side water passage (3) with the water pump (10) and the other opening of the side water passage (3) being sealed.

3. The multi-cylinder engine as set forth in claim 1 or 2, wherein the cylinder block (1) is provided with a consecutive side oil passage (2) oriented in the front and rear direction, and lubricating oil is introduced into a bearing portion of a crank shaft through the side oil passage (2),
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35 the side oil passage (2) having front and rear end

portions provided with front and rear openings (2c), (2d) which communicate the side oil passage (2) with an oil filter (2b) through a filter attaching seat (46),

5 even if the filter attaching seat (46) is arranged at either of the front and rear end portions of the cylinder block (1), the opening of the side oil passage (2) near the end portion where the filter attaching seat (46) is arranged, being able to communicate the side oil passage (2) with the oil filter (2b) through
10 the filter attaching seat (46),

the filter attaching seat (46) being disposed at one of the front and rear end portions of the cylinder block (1) where the water pump (10) is arranged, the opening of the side oil passage (2) near the end
15 portion where the filter attaching seat (46) is disposed, communicating the side oil passage (2) with the oil filter (2b) through the filter attaching seat (46), the other opening of the side oil passage (2) being sealed.

20 4. The multi-cylinder engine as set forth in claim 1, wherein a timing transmission device (8) is disposed at one of the front and rear end portions of the cylinder block (1), where the water pump (10) is arranged.

25 5. The multi-cylinder engine as set forth in claim 4, where this engine is used as an engine to be loaded on a tractor, in which the water pump (10) is arranged at an end portion of the cylinder block (1), away from an operator's seat.

30 6. The multi-cylinder engine as set forth in claim 1, wherein the water pump (10) is arranged at the end portion opposite to one of the front and rear end portions of the cylinder block (1), where the timing transmission device (8) is disposed.

35 7. The multi-cylinder engine as set forth in claim

1, wherein when applying this invention to a vertical engine, the side water passage (3) has an outlet (5) opposed to a lower portion of the cylinder jacket (4).

5 8. The multi-cylinder engine as set forth in claim 1, wherein when the side water passage (3) is arranged together with a pair of upper and lower shafts (6), (7) on one side of the cylinder block (1) in the vertical engine, the side water passage (3) and the pair of upper and lower shafts (6), (7) are disposed vertically
10 along the cylinder jacket (4) and the cylinder walls (12).

9. The multi-cylinder engine as set forth in claim 1, wherein the side water passage (3) which passes by all the cylinder walls (12) are provided with the
15 outlet (5) in plural number, these outlets (5) being disposed at longitudinally opposed end portions and a mid portion of the side water passage (3).

10. The multi-cylinder engine as set forth in claim 9 wherein a tappet guide hole (14) of a valve operating device is provided within a wall (13) between
20 adjacent outlets (5), (5) of the side water passage (3).

11. The multi-cylinder engine as set forth in claim 9 or 10, wherein the side water passage (3) has each of the outlets (5) facing a laterally projecting
25 end surface (15) of every cylinder wall (12).

12. The multi-cylinder engine as set forth in claim 1, wherein the adjacent cylinder walls 12 and 12 are connected to each other by a connection wall (16), which is formed with an inter-cylinder transverse water
30 passage (17) running widthwise of the cylinder block (1).

13. The multi-cylinder engine as set forth in claim 12, wherein a head jacket (25) is provided within a cylinder head (18) and an inter-port transverse water
35 passage (21) is formed widthwise of the cylinder head

(18) between an intake port (19) of the cylinder head (18) and an exhaust port (20) thereof, and

cooling water which has crossed the inter-cylinder transverse water passage (17) is made to return and
5 cross the inter-port transverse water passage (21).

14. The multi-cylinder engine as set forth in claim 13, wherein a head intake side water passage (26) is formed on the side of an intake air distributing means (22) of the cylinder head (18) and a head exhaust
10 side water passage (27) is formed on the side of an exhaust air converging means (23) thereof along a longitudinal direction of the cylinder head (18), the head intake side water passage (26) communicating with the head exhaust side water passage (27) through the
15 inter-port transverse water passage (21),

the cylinder head (18) having widthwise opposite sides, on one of which the side water passage (3) is present and the cylinder head (18) has a corner portion (28) formed with an outlet (25a) of the head jacket (25),
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the cooling water which has crossed the inter-cylinder transverse water passage (17) from the side water passage (3) to the opposite side floating up to the water passage (26) opposite to the side water
25 passage (3), of the head intake side water passage (26) and the head exhaust side water passage (27), the floating-up cooling water dividing into a plurality of inter-port transverse water passages (21) while passing through the water passage (26) toward the outlet (25a),
30 the thus divided cooling water converging into the water passage (27) on the side of the side water passage (3) and passing through the water passage (27) toward the outlet (25a), the cooling water which has passed through both of the water passages (26) and (27)
35 toward the outlet (25a) being made to converge and flow

out of the outlet (25a) of the head jacket (25).

15. The multi-cylinder engine as set forth in claim 12 or 13, wherein the cooling water which has crossed the inter-port transverse water passage 21
5 flows from the intake air distributing means (22) on one side of the cylinder head (18) to the exhaust air converging means (23) on the other side thereof.

16. The multi-cylinder engine as set forth in claim 3, wherein

10 one of the front and rear end portions of the cylinder block (1) in which the timing transmission device (8) is arranged is taken as a front end portion, and a timing transmission case (43) has a front wall (43a) at which the filter attaching seat (46) is
15 disposed, a case side bypassing oil passage (43c) being formed along the front wall (43a) and a peripheral wall (43b) of the timing transmission case (43), a block side bypassing passage (1a) being formed at the front end portion of the cylinder block (1), lubricating oil
20 being fed to the side oil passage (2) while bypassing the timing transmission device (8), through the oil filter (2b), the case side bypassing oil passage (43c) and the block side bypassing passage (1a) in the mentioned order.

25 17. A method for alternatively producing multi-cylinder engines wherein a longitudinal direction of a cylinder block (1) is deemed as a front and rear direction, and one of the longitudinal direction is regarded as a front end portion while the other, a rear
30 end portion, on the assumption that an engine which comprises a water pump (10) arranged at the front end portion of the cylinder block (1) is an engine of front-end pump arrangement type and another engine which comprises the water pump (10) arranged at the rear end
35 portion is an engine of rear-end pump arrangement type,

the cylinder block (1) being used as a common part, when alternatively producing the engine of front-end pump arrangement type and the engine of rear-end pump arrangement type ,

5 the cylinder block (1) used as the common part being provided with a consecutive side water passage (3) oriented in the front and rear direction, and passing by every cylinder wall (12), cooling water from a radiator being made to enter a cylinder jacket (4) laterally
10 through the side water passage (3), the side water passage (3) having front and rear end portions formed with front and rear end openings (3a), (3b) which communicate the side water passage (3) with the water pump (10),

15 in the case where the engine of front-end pump arrangement type is produced, the water pump (10) being arranged at the front end portion of the cylinder block (1), the front end opening (3a) of the side water passage (3) communicating the side water passage (3) with the
20 water pump (10) and the rear end opening (3b) of the side water passage (3) being sealed,

 in the case where the engine of rear-end pump arrangement type is produced, the water pump (10) being arranged at the rear end portion of the cylinder block
25 (1), the rear end opening (3b) of the side water passage (3) communicating the side water passage (3) with the water pump (10) and the front end opening (3a) of the side water passage (3) being sealed.

18. The method for alternatively producing multi-
30 cylinder engines as set forth in claim 17, wherein the engine of front-end pump arrangement type arranges a filter attaching seat (46) at the front end portion of the cylinder block (1) and the engine of rear-end pump arrangement type arranges the filter attaching seat (46)
35 at the rear end portion thereof,

the cylinder block (1) used as the common part being provided with a consecutive oil passage (2) which is oriented in the front and rear direction and introduces lubricating oil into a bearing portion (2a) of a crank shaft through the side oil passage (2), and the side oil passage (2) having front and rear end portions provided with front and rear end openings (2c), (2d) which communicate the side oil passage (2) with the oil filter (2b) through the filter attaching seat (46),

in the case of producing the engine of front-end pump arrangement type, the front end opening (2c) of the side oil passage (2) communicating the side oil passage (2) with the oil filter (2b) through the filter attaching seat (46) at the front end portion and the rear end opening (2d) of the side oil passage (2) being sealed,

in the case of producing the engine of rear-end pump arrangement type, the rear end opening (2d) of the side oil passage (2) communicating the side oil passage (2) with the oil filter (2b) through the filter attaching seat (46) at the rear end portion and the front end opening (2c) of the side oil passage (2) being sealed.

19. The method for alternatively producing multi-cylinder engines as set forth in claim 17 or claim 18, wherein the engine with the timing transmission device (8) arranged at one of the front and rear end portions of the cylinder block (1) where the water pump (10) is disposed is employed as an engine to be loaded on a tractor with the water pump (10) to be arranged at an end portion of the cylinder block (1) away from an operator's seat.